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Research Article

DETERMINING THE LEVEL TECHNOLOGICAL CAPABILITY OF IRAN'S STEEL INDUSTRYAND IDENTIFIES ITS STRENGTHS AND WEAKNESSES (CASE STUDY: KERMAN STEEL)

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ABSTRACT
A competitive firm can effectively integrate the processes of technological planning and business planning. This firm should be able to design intelligent and active systems that can quickly react to very dynamic environment events. Therefore the firm management must reinforce critical skills within the firm and reduce its weaknesses until firm can nicely use the market opportunities and passes its threats. In this paper we decided to pay the Kerman Steel by determining the strengths and weaknesses of the firm and determining the size of the technological gap in each level. To perform this study the Panda and Ramanathan technological analyze models were used. This model by 3 main dimensions and 9 subsidiary dimensions analyzed the firm capabilities and in each one specifies the firm status. Statistical population is Kerman Steel employees that 20 persons of experts and specialists of that firm complete our questionnaire. This questionnaire consisted of 36 questions and design in three basic dimensions and 9 subsidiary dimension of technological level. This research in terms of the purpose is practical and in terms of procedure type is survey.

Keywords: *Technology, Technological Capabilities, Panda and Ramanathan*

INTRODUCTION
Robust systems design requires to take strong strategically management audaciously actions and requires specify a clear mission and requires designing of necessary strategies and plans to fulfill that mission. Company management must design necessary structure to support their audaciously actions and ensure that communication channels and strong and good communication is established between firm operating units.

A competitive company to provide real value to its customers must rely on their core competencies. Key and core competencies are competencies that gave company a sustainable and remarkable excellence and competitive advantage. Furthermore, a competitive firm should continuously monitor the environment to be able to identify opportunities and avoid threats and identify any gap between itself and its competitors in terms of capabilities and competencies. After identifying immediately design plans to fill the gaps and take advantage of opportunities. This process should be explicit and regular and well documented (Tarek, 2002).

Literature Review
Technology consists of three components that are interdependent to each other and determinant together and have similar importance:

Hardware: Physical structure and Logical arrangement of equipment or machinery that are supposed to be used to perform the required tasks.

Software: Knowledge of how to use the hardware to perform the necessary tasks

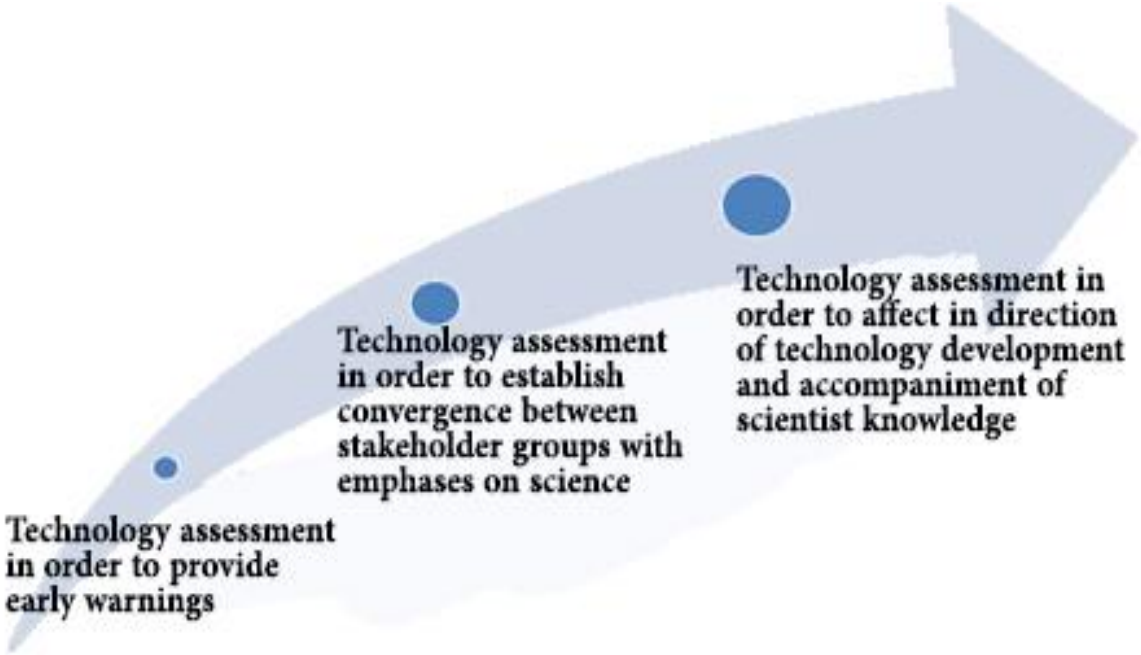
Brain-Ware: Reasons for using technology in specific manner (Zeleny, 1986)

Technology is an essential part of a global strategy for economic growth that this strategy consists of three *Components:* economy, business and technology (Mitchell, 1995).

Technology is re-shaping our world by unimaginable speed and just form a few decades ago (NSTC, 1996)

Science: How are things?

Technology: How this things should be done.
Management: How assign things to do.
Technology Management: Do things.
Entrepreneurship: Doing things for money.
Innovation: Do Entrepreneurship (Mitchell, 1995).
In other words technology is a set consist of information and tools and techniques that is origin from knowledge and practical experience and used in development and design and manufacture of products and processes and systems and services.
On the other hand technology consists of any device or technique, any product or process, any physical equipment or method of production that expand the ability of man (Moghaddam, 2011).
Technology is all knowledge's and products and tools and methods and systems that are employed to provide a product or a service.
Technology is process of transmission and converts the resources into products through knowledge and experience and information and tools (Tarek, 2002).
Also evaluation of technology capabilities is a process that in which the current level of the plant technological capabilities and abilities are measured until to identify the strengths and weaknesses of plant and also can compare the plant technological capabilities with competitors in the ideal level and take action in order to compensate for adverse cases (Tabatabaian, 2005).
Technological capabilities in an industry including technical and managerial and institutional skills and is result of combining the knowledge and skills of firm members over time. Innovation capabilities are only one aspect of technological capabilities.
Technological capabilities in a manner that an organization combining all items such as skills and people learning's and educational competences and used technology in machines and etc until act like a organization.
This process is accompanied by permanent interaction between members and efficient flow of information and decisions and synergistic (Ll, 2006).
Technological capabilities and technical capabilities that directly support the status of goods or services are divided in three branches: capabilities of Applied Sciences, capabilities of design and development, manufacturing capabilities (Khalil, 2002).



Stages evolution of technological assessment (Bagheri Moghaddam, 2011)

Table 1: Classification of technological capability assessment models (Khamseh, 1392)

Models of providing solutions to compensate the technology gap	Models of assess the causes of the technology gap	Models of determining the technology gap
Ford model	Ford model	Atlas technology model
Lindsay model	Lindsay model	Porter model
Fall model	Atlas technology model	Panda and Ramanathan model
Model of Garcia – Arrola	Floyd model	Floyd model
Lin model	Management model of technology needs	Management model of technology needs
Assessment model of technology needs	Model of levels capabilities of the technology	Assessment model of technology content
Model of management information systems of science and technology		Assessment model of technology Position
Management model of technology needs		Model of economic added value

Objectives, Methods and Research Questions

The purpose of this research is determining the level of technological capabilities of Kerman Steel and determining the strengths and weaknesses of each level. The aim of this study in terms of purpose is practical and in order of method is survey.

The research questions are:

1. Each one of the indicators of technological capabilities of Kerman Steel is located at what level?
2. Each one of the main and subsidiary dimensions and total technological capabilities of Kerman Steel is located at what level?
3. Technological gap of Kerman Steel in three basic dimensions of technological capabilities is in what level?

Introduction of the used Model in this Study

Panda and Ramanathan technological levels assessment model is a tool to detection and identification the required capabilities to implement the technology priorities in firms that investigate the technological capabilities levels in 3 main dimensions and 9 subsidiary dimensions with 36 indicators. Figure 1 shows the classification of technological capabilities dimensions based on Panda and Ramanathan model. Due to the conceptual model of research the questionnaire indicators was designed (Table 3).

Panda and Ramanathan technological levels assessment model

Figure 1: Classification of technological capabilities dimensions based on Panda and Ramanathan model (Radfar, 2011)

Statistical Population

Statistical population is 20 person included senior and middle managers and experts of the production and designing and development and standard control of Kerman Steel by degrees of bachelor and Master of Science and work experience of 1 to 16 years.

Table 2: Parameters of the respondents descriptive

Average Work Experience (year)	% of total	Number	Degrees	Row
7.93	%60	14	bachelor	1
5.83	%40	6	Master of Science	2
	%100	20	sum	3

Summarizing the Research Findings

Question 1: Each one of the indicators of technological capabilities of Kerman Steel is located at what level?

Achieved results of the first question of study based on the summarizing of questionnaires are mentioned in Table 3.

Table 3: Average indices and components and dimensions

Gap (Percent)	Average index (percent)	Index	row	components	Dimensions
23.33	68.25	Improve existing products and processes	1	Creative capability	Strategic Capabilities
41.33	71.00	Innovation of new products and processes	2		
30.50	67.50	Create new organizational structures	3		
38.50	68.75	Planning, monitoring and control of D & R projects	4		
28.83	63.50	Projects evaluation based on the technical and economic and financial and environmental and, social consequences	5	Design and engineering capability	
23.83	61.50	Conventional design and detailed engineering in processes and products	6		
34.00	65.25	Reconstruction or rebuilding purchased technology	7		
26.50	69.50	Adapt to purchased or created technology	8		
30.67	65.50	Planning and monitoring and controlling the activities of design and engineering contracts	9		
29.33	65.00	Support of feasibility studies and ability to perform value engineering	10	Manufacturing capability	
27.00	64.25	Activities related to the construction of structures	11		
20.83	66.25	Doing contractor activities	12		
27.67	65.75	Planning, control and supervision of construction, erection and commissioning	13		
34.17	65.00	Application and effective control of technology in the main processes and supporting	14	Production capability	Tactical technological capabilities
20.33	67.25	Quality assurance, inspection and	15		

		inventory control			
24.67	67.00	Troubleshooting and preventive maintenance and repair of breakdowns	16		
26.00	64.25	Manufacturing planning and scheduling of equipment maintenance	17		
28.83	65.25	Identify customers and announced the auctions price and, negotiations about the terms of sale	18	Marketing and sales capability	
28.17	66.00	Product supply or service to customers	19		
27.67	68.00	Planning and monitoring and coordination of marketing activities and sales	20		
25.33	67.50	Identify problems and doing corrective action and take out of the product	21	Service capability	
28.83	64.25	Provide technical proposals to customers	22		
31.17	69.00	Conducting research to identify the needs of customers and their satisfaction levels	23		
30.50	69.00	Planning and monitoring and coordination of service delivery and scheduling of equipment and service staff	24		
33.50	68.00	Identifying and evaluating and negotiating and finalizing the acquisition of technology and support facilities	25	Acquisition capability	Complementary technological capabilities
27.33	69.00	Identify and evaluate and negotiate and finalizing the terms of supplied finances	26		
25.33	69.50	Identify, evaluate, negotiate and finalize the terms of provide manpower	27		
29.00	66.50	Planning, monitoring and coordination of processes of resources supplied	28		
27.67	65.75	Provide training programs	29	Supported capability	
31.83	60.25	Strategic Planning	30		
29.17	62.00	Networking and information support	31		
35.50	62.25	Maintaining high levels of security and safety	32		
43.83	73.50	Technology sales	33		
40.33	74.00	Routing	34	Strategic capability	
23.33	73.75	Decision-making and implementation	35		
33.33	76.00	Integration of organizational activities	36		

Question 1: Each one of the main and subsidiary dimensions and total technological capabilities of Kerman Steel is located at what level?
Results of the the second research question is mentioned in Table 4 to 7 and charts1 to 4.
The company's strategic technological capabilities are in what level?

Table 4: Levels of strategic capabilities

The success rate of each Subsidiary dimension	components
%68.88	Creativity Capability
%65.05	Design and engineering capabilities
%65.31	Manufacturing Capability
%66.31	Average overall strategic capabilities

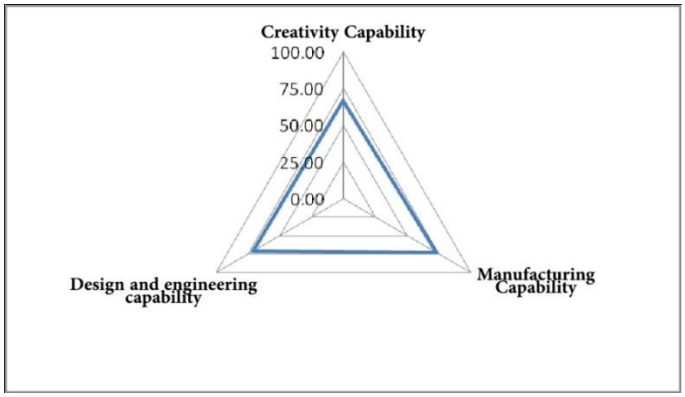


Figure 1: Strategic Capabilities

- The company's technological tactical capabilities are in what level?

Table 5: Average level of technological tactical capabilities

The success rate of each Subsidiary dimension	components
%65.88	Production Capability
%66.42	Marketing and sales Capability
%67.64	Service Capability
%66.59	Average total tactical capabilities

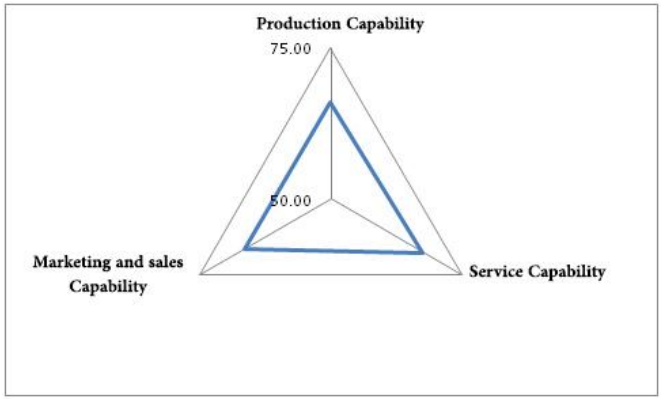


Figure 2: Tactical technological capabilities

The technological capabilities supplements of company are in what level*?*

Table 6: Average level of supplement technological capabilities

The success rate of each Subsidiary dimension	Components
%68.25	Acquisition capability
%64.75	Support capability
%74.59	Strategic capability
%68.38	Total average of supplements capabilities

Table 7: Average scores and percent capability dimensions levels of technological ability

Percent capacity of main dimensions	Percent capacity of subsidiary dimensions	Subsidiary dimensions	Main dimensions
%66.31	%68.88	Creativity Capability	Strategic technological capabilities
	%65.05	Design and engineering capabilities	
	%65.31	Manufacturing Capability	
%66.59	%65.88	Production Capability	Tactical technological capabilities
	%66.42	Marketing and sales Capability	
	%67.64	Service Capability	
%68.38	%68.25	Acquisition capability	Supplement technological capabilities
	%64.75	Support capability	
	%74.59	Strategic capability	
%67.08			Total technological innovation capabilities

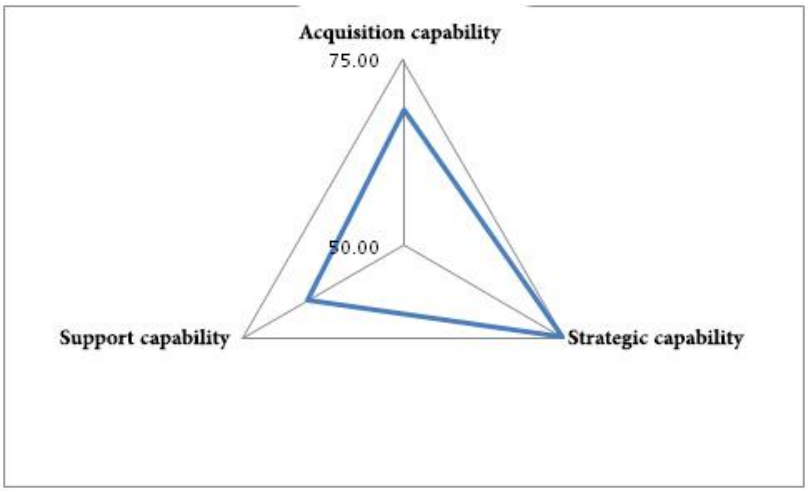


Figure 3: The supplements technological capabilities

Total technological innovation capabilities of company are in what level?

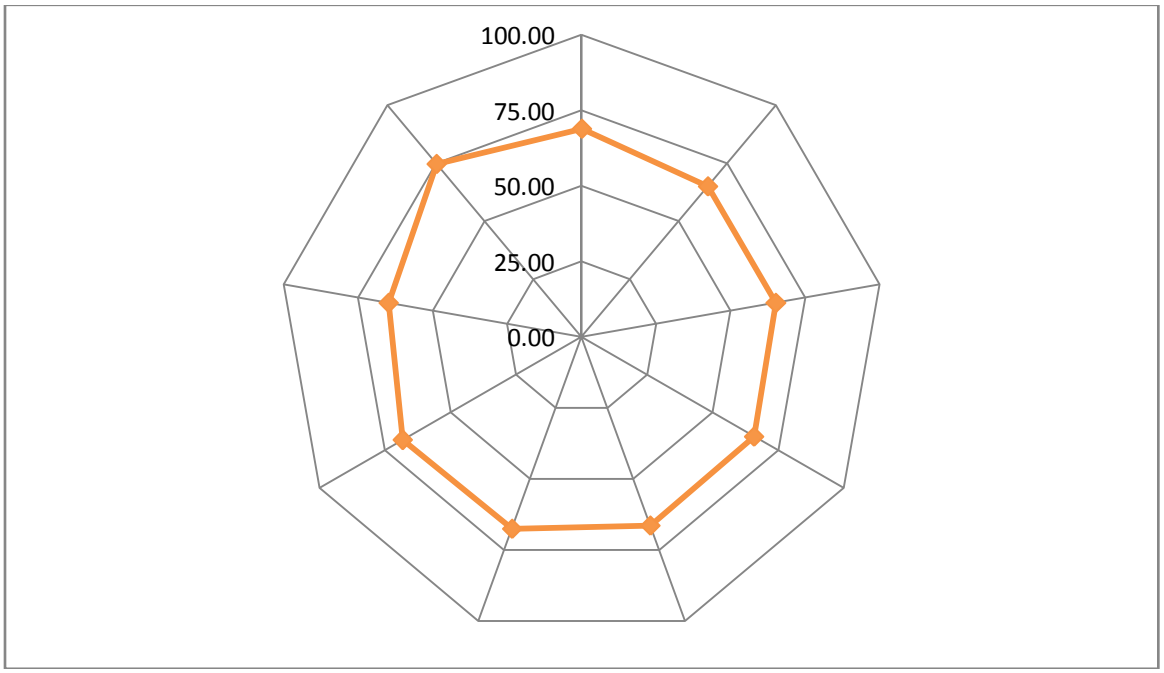


Figure 4: Technological capabilities in various dimensions

Table 8: Amount of quantitative gap between current level and desired levels

The amount of gap between current level and desired levels	Current Level	Technological capabilities
%33.69	%66.31	Strategic Capabilities
%33.41	%66.59	Tactical Capabilities
%31.62	%68.38	Supplements capabilities

Question 1: Technological gap of Kerman Steel in three basic dimensions of technological capabilities is in what level?

According to the current technological level and the desired level (100%) it can be said that between this two-level there are different in three technological innovation capabilities of company that the amount of each of the main dimensions are presented in Table 8 and Chart 5.

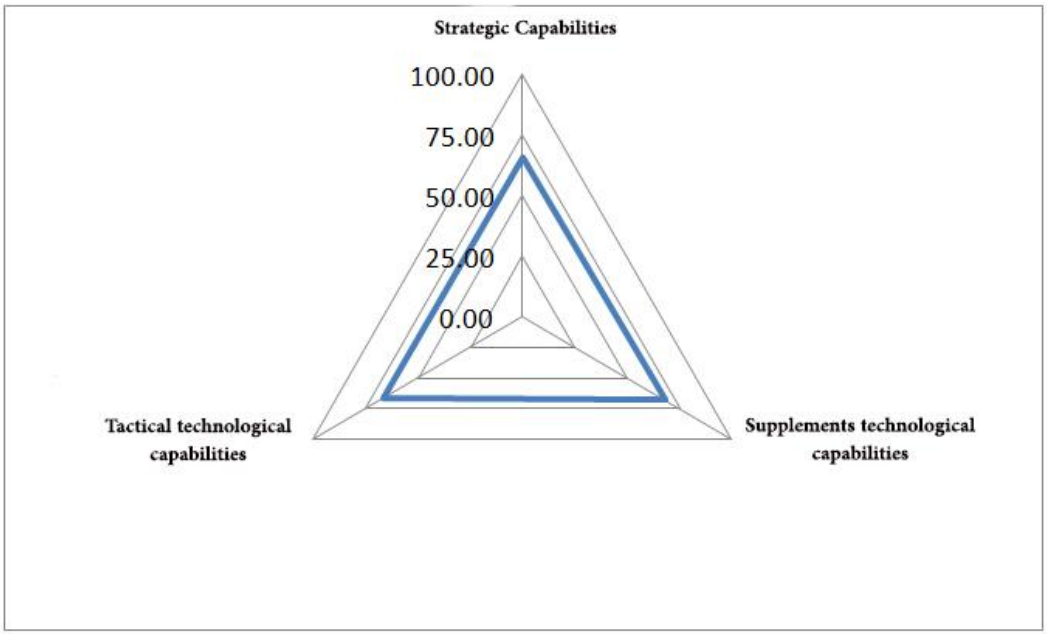


Figure 5: Chart radar of technological capabilities levels in various dimensions

Conclusion

Analysis and Conclusion

- The main dimension of strategic capabilities in accordance with Table 4 the subsidiary dimension of creative capability with 68.88 percent has highest and the subsidiary dimension of design and engineering with 65.65 percent have lowest rating. Of course the subsidiary dimension of manufacturing capability with 65.31 percent is also close to another two subsidiary dimensions and a convergence is seen between the three subsidiary dimensions.
- In the main dimension of tactical capabilities according to Table 5 the subsidiary dimension of service capability with 67.44 percent have highest and subsidiary dimension of production capability with 65.88 percent have lowest rating. Of course the subsidiary dimension of marketing and sales capability with 66.42 percent a positive convergence percent is seen between these three dimensions.
- In the main dimension of supplements capabilities according to Table 6 the subsidiary dimension of support capability with 64.75 percent have lowest and subsidiary dimension of strategic capability with 74.58 percent have highest rating and according to the subsidiary dimension of acquisition capability with 68.25 percent rating a positive convergence percent is seen between these three dimensions.
- According to Table 7: Summarizes the results indicate that the Supplements capabilities by 68.38 percentage of rating are most capable and the dimension of strategic capabilities with 66.31 percent of rating have lowest capability and total average of technological innovation capabilities of company is 67.08 percent that is away 32.92 percent from desirable situation.
- Since in all levels there are gaps between current status and desired status then, according to results the following suggestions are offered:

1. The establishment of technological management system
2. The proper planning and teamwork proposal
3. Define improvement projects
4. Correct decisions to eliminate the current gaps
5. Offer training classes to strengthen the Supplements capabilities

6. Integrating technology planning and business planning
7. Create active and intelligent design systems for responding to the very dynamic environment interactions

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